a search tree:A (start) = 5, B = 4, C = 2, D = 1, Goal = 0Using Greedy Best-First Search, show the order in which the nodes would be expanded starting from A. Explain the steps briefly.

b) Given the evaluation function for A* search:

f(n) = g(n) + h(n)

Where:

g(n) = cost to reach node n from the start

h(n) = estimated cost from n to the goal

Given the following values:

Node A: g=0, h=5

Node B: g=2, h=3

Node C: g=4, h=1

Which node will A* expand first? Show the f(n) values and justify your answer. 5+5

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B.Tech Even Semester Examination, May, 2025

Computer Science & Engineering

(8th Semester)

Course No: CSE-801(4)

(Artificial Intelligence)

Full Marks: 50

Pass Marks: 25

Time: 2 hours

Note:

1. Attempt any five questions.
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

1. (a) Consider a knowledge base represented using propositional logic. Given the following:

   · If it is raining, then the ground is wet.

   · If the ground is wet, then the game is cancelled.

   · It is raining.

   Represent this knowledge using logical expressions and apply modus ponens to infer whether the game is cancelled. Show all steps in your reasoning.

   (b) Give a brief introduction to the Turing test in AI?

   (c) What are metaknowledge and domain knowledge in expert systems? 5+2.5+2.5

Turn Over

2. (a) Expert systems are designed to replicate human expert decision-making in specialized domains. With reference to this, answer the following question: Differentiate between human experts and artificial experts with suitable examples.

(b) Explain the role of the inference engine and the knowledge base in the architecture of an expert system. Illustrate your answer with a neat diagram.

(c) Define the following terms with relevant examples:

- Rule base
- Forward chaining
- Backward chaining 4+3+3

3. a) Given the rules:

- IF it is raining THEN the ground is wet.
- IF the ground is wet THEN the match is postponed.
- It is raining.

Apply forward chaining to deduce the final outcome. Show your reasoning step by step.

b) Construct a semantic network for the following knowledge:

"A whale is a mammal. Mammals are animals. Animals need food. Whales live in oceans and have lungs." Label all nodes and relations clearly.

c) Describe semantic networks as a method of knowledge representation. 3+4+3

4 a) You are comparing two expert system tools:

- Tool A provides graphical interfaces and drag-drop rule building.
- Tool B offers logic-based scripting with advanced inference capabilities.

Which tool is better suited for a medical diagnosis system and why?

b) Discuss three major constraints in the development of expert systems. 5+5

5. a) Briefly describe two real-world expert systems, such as MYCIN (medical) and DENDRAL (chemical analysis).What made them successful, and what were their limitations?

b) Critically analyze the statement: "Expert systems are powerful but not always reliable."Support your argument with examples of failure points and how they could be mitigated. 5+5

6. a) Show the working of the Minimax algorithm using Tic-Tac-Toe Game.b) Differentiate between Uninformed and Informed Search technique. 5+5

7. a) Why is explainability important in AI systems, especially in critical domains such as healthcare, finance, and law?

b) Discuss the trade-off between model accuracy and interpretability with examples (e.g., decision trees vs. deep neural networks). 5+5

8. a) Consider the following heuristic values for reaching the goal node from given nodes in